

Tempe Fire Department Policies and Procedures

Vehicle Fires

209.06

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This procedure provides the firefighter with a basic knowledge of operational tactics and special hazards associated with vehicle fires. Ongoing study must be done by the firefighter to stay informed of the fast changing technology of today's vehicles.

FIRE CONTROL OPERATIONS

As in all fire department operations, safety is the primary concern for both Fire Department personnel and the general public. Full turnout gear must be worn by all fire personnel at reported vehicular fire incidents. SCBAs must be worn at all incidents where there is smoke or where a sustained hazardous condition exists. Firefighting personnel must fully protect themselves against any eventuality and must anticipate that the situation could worsen instantly.

Proper positioning of fire apparatus can provide an additional margin of safety to firefighters. Park up hill and upwind when possible. The apparatus should be positioned at a reasonable distance from the vehicle; 75 to 100 feet is recommended. It should be positioned diagonally across lines of traffic to allow ease of line deployment and provide a measure of safety for the attack crew by blocking traffic. A dry powder extinguisher should be taken off the truck and placed in an accessible location should an emergency arise. The 1-1/2" hose line is the minimum size acceptable for vehicle fires.

Under fire conditions, an electrical short can cause the starter motor to engage, causing the vehicle to lurch forward or backward. Prevent vehicles from moving or rolling by chocking the wheels. Beware that vehicles equipped with catalytic converters will retain and radiate heat, upwards to 1000 degrees fahrenheit long after the vehicle has quit operating. This is a particular problem when dry vegetation or a fuel spill is present. Under no conditions should any firefighter get under a vehicle involved in a fire. Tires suddenly deflating or an air suspension system failure may cause the vehicle to collapse, trapping or crushing anyone under it. During a fire in or near the engine compartment, the various types of mechanisms that are designed to hold the hood open may be weakened; it may be necessary to support the hood to allow access and to prevent injury.

Further, it is equally important to safeguard the general public. Spectators should be cleared from the immediate area, including the owner and occupants of the vehicle. Do not allow civilians to interfere with operations.

HAZARDS & SAFETY CONSIDERATIONS

In all vehicle fires, hazards are present until the situation is completely stabilized. These hazards will take several different forms and can be categorized as follows: electrical, fuel system, mechanical equipment, and special hazards.

Electrical

Not all vehicular fires are of the well-involved variety, and it will be necessary in these situations to disable the vehicle by disconnecting the battery supply. When disconnecting battery cables, identify and disconnect the ground or negative side first. Disconnecting the positive side first can create a spark, which if flammable hydrogen gas vapors are present, may cause the battery to explode. As an additional note, some vehicles may possess two batteries, particularly recreational vehicles and vehicles with diesel engines. Both batteries will have to be disabled. This should be done by disconnecting both ground (negative) cables before removing either positive cable. Personnel should have eye protection in place and avoid working directly over the battery to prevent acid burns in the event of a battery explosion.

Fuel

Contemporary motor vehicles operate with a sealed fuel system (when gasoline is the fuel). The system is designed to collect fuel vapors and route them to the carburetor in order to make it more efficient. As such, caps on tanks are non-venting unless pressure builds in the tank, they then will function to relieve the pressure. A sealed fuel system will build heat and pressure during a fire that may lead to tank rupture. On at least one occasion, recently, the NFPA reports a fuel tank rupture produced a fireball with a radius of 60' causing heavy damage to the fire apparatus. For this reason, attack crews should direct a stream upon the fuel tank if conditions exist that could lead to tank rupture. Further, crews should approach a vehicle involved in fire from the side of the vehicle at an angle (towards the corners).

Many vehicles may have more than one fuel tank, some of these add-on tanks are made of plastic. In addition, some vehicles may possess large capacity homemade tanks. These usually are of the unvented variety. Further, many vehicles may have the tank located at a place other than at the rear of the vehicle. For example, VW Beetles have the tanks located forward of the driver in the trunk area. In most older model pick-up trucks, the tank is located behind the seat in the cab. Also, some vehicles may carry extra fuel cans in the trunk. Lastly, many vehicles are powered by alternative fuel sources such as propane, compressed natural gas (CNG), or electricity. Tanks containing propane or CNG are usually placed in the trunk or truck bed area as they are large and bulky. Tanks that contain CNG or propane under pressure may potentially BLEVE or fail when exposed to fire.

During a fire, fuel lines to the engine may melt allowing fuel to flow freely. It will be necessary to shut off this flow to either control the fire or if fire is extinguished, to prevent the re-ignition of the fuel. For this purpose, "ducseal" and "Plug-N-Dike" is carried in the tool box on each apparatus. Use these materials to plug the line to shut off the flow. The NFPA recommends that under no conditions should the fuel system be flushed, as this tends to dump fuel that could ignite.

Mechanical

Newer vehicles are equipped with certain mechanical equipment that may present a hazard during a fire.

Be sure to note if vehicle has an airbag system. If so, disconnect the battery negative cable before working around the airbag module. This is the most important way to prevent the bag from deploying while extricating a victim. In a rescue situation, don't apply heat, cut, or drill the actual airbag module. Also, try not to position yourself against or very close to the airbag module. For vehicles with deployed airbags, try to avoid contact with the white or greyish powder residue produced during activation. This is an irritant that should be washed off as soon as possible to avoid contact with eyes or mouth.

The energy absorption bumper systems designed to prevent vehicle damage from low speed collisions, contain hydraulic fluid. In the event of a fire, this fluid will heat-up causing pressure to increase within the cylinder to the point of rupture. Should a rupture or explosion occur, metal fragments or even the bumper may be ejected causing injury. Enclosed, hollow shaft drivelines may present the same problem. Although air-filled, pressure can still develop during a fire causing a rupture/explosion, resulting in flying metal fragments. Excessive pressure may develop in lift assists causing a trunk, hatch, or hood to fly open with explosive force when the latch mechanism is released. To insure personal safety, be sure to allow sufficient clearance when releasing latches. Keep in mind, any mechanical device containing fluid can rupture violently during a fire, e.g., radiator, power steering units, etc. Avoid such areas until water can be applied upon the units, cooling them to a less hazardous level.

Tires or split rims exposed to fire may explode, causing the vehicle to drop suddenly. Expect exploding rim parts or tire debris to be expelled outward from the sides. Again, approach at an angle to the vehicle for maximum protection from potential flying debris. Some larger vehicles, such as buses, employ an air suspension system. When these systems are exposed to heat or flame, they may fail, causing the vehicle to SUDDENLY drop several inches.

Special

Magnesium constitutes the main special hazard likely to be encountered by attack crews in a vehicle fire. Magnesium is used for some types of decorative wheels and as a component for engines of some makes of vehicles, particularly Volkswagen. When ignited, magnesium burns fiercely and at times produces a series of small explosions. A magnesium explosion will scatter burning magnesium fragments that can cause severe burns. Burning magnesium may react violently with water, however, the primary method of extinguishment is to directly apply copious amounts of water.

Well-sealed interiors of modern vehicles present the potential for backdraft. Use caution when opening doors or breaking windows. Appropriate approach, ventilation, and safety concerns must be considered. Have a charged handline ready before making entry.

Lastly, be aware that any vehicle may be transporting a hazardous cargo, creating an unknown danger. If possible, inquire as to the nature of any materials being transported. Be prepared for the worst!